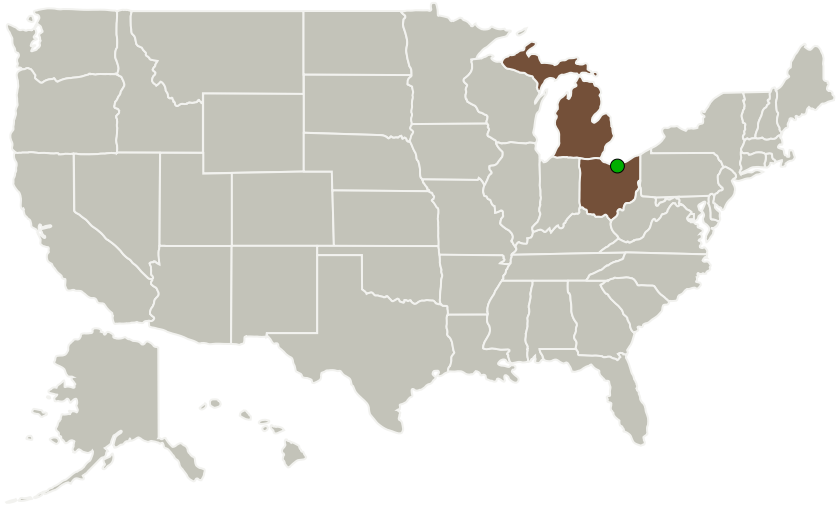
Divergent Field Annular Ion Engine, Phase I

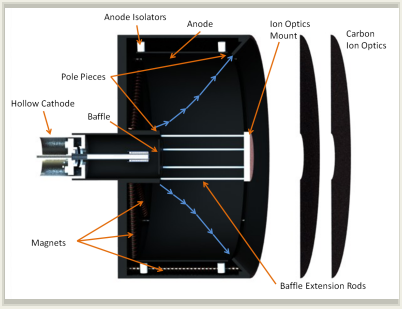
Completed Technology Project (2014 - 2014)

Project Introduction

The proposed work investigates an approach that would allow an annular ion engine geometry to achieve ion beam currents approaching the Child-Langmuir limit. In this respect, the annular engine, whose design inherently allows for significant increases in perveance by resolving the span-to-gap problem, can achieve the projected high current densities necessary for high thrust, high power applications. The case for high power gridded ion thrusters is compelling if not only for risk reduction in contrast to lower TRL Hall thruster variants such as the nested channel systems. This point cannot be over emphasized as there is now significant effort and resources applied to Hall engine development. Yet there still remains some uncertainty as to how high power variants or magnetically insulated variants will actually perform in space. Interpretation of high power Hall engine operation in ground test facilities is also not completely well understood. This is in contrast with gridded ion technology whose facility corrections are well understood. The current investment in high power gridded ion thruster technology is minimal. This effort seeks to address this gap in technology development and in the process continue the advancement of a credible risk reducing technology for high power mission applications.

Primary U.S. Work Locations and Key Partners





Divergent Field Annular Ion Engine Project Image

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Organizations Performing Work	Role	Type	Location
ElectroDynamic Applications, Inc.	Lead Organization	Industry Minority-Owned Business	Ann Arbor, Michigan
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Michigan	Ohio

Project Transitions

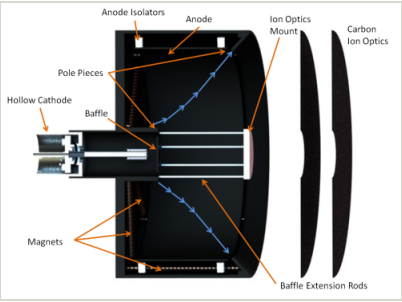
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137564)*

Images



Project Image
Divergent Field Annular Ion Engine Project Image
(https://techport.nasa.gov/image/130929)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ElectroDynamic Applications, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

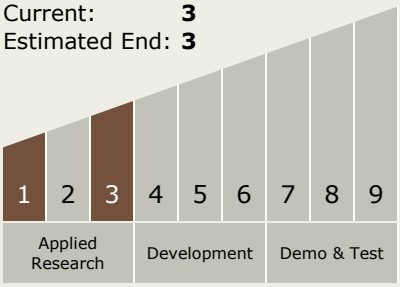
Carlos Torrez

Principal Investigator:

Christopher Davis

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System